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4. The variations which I have observed in the different types of Angiosperms depend on the arrest of development more or less early which seizes the special mother cells.

5. The first cell always forms the sexual preparation. It blends itself with the second cell to thus constitute the greater part of the embryo-sac. When the second cell produces a "*tetrade*," the eight nuclei freed from the embryo sac act as M. Strasburger describes it in *Orchis* and in *Monotropa*. This fact is observed in certain Monocotyledons and dialypetalous Dicotyledons.

6. The other special mother cells (3, 4, 5) may produce some "*tetrades*." Each one of the vesicles is homologous with a grain of pollen, and it is tempting to give to it the name of antipodal. When these mother cells persist in their primitive condition without producing "*tetrades*," they themselves simulate antipodal vesicles superposed, not juxtaposed. They differ from them from a morphological point of view and I have given to them the name of *anticlinal cells*.

This condition has been observed in many Monocotyledons, certain dialypetalous Dicotyledons, and in almost all the Gamopetalæ.

7. The 2d cell appears to undergo at first an arrest of development. In this case, its nucleus becomes directly the nucleus proper of the embryo-sac, and this cell does not produce any antipodal vesicle. This fact, observed in some Monocotyledons and Dialypetalæ, becomes the rule in Gamopetalæ, which are, from this point of view, the plants most removed from Cryptogams.

8. In the Gamopetalæ (with very few exceptions), cell one alone produces a "*tetrade*," complete or incomplete, which is no other thing than the sexual preparation composed of two or three or four vesicles.

The second cell seems to perform the vegetative part of the embryo-sac. Its undivided nucleus becomes the nucleus of the embryo-sac.

The cells 3, 4, 5 (or 3, or 3 and 4, according to the number of the special mother cells) are some anticlinal, or produce the antipodal vesicles by dividing their nucleus.

9. In the greater part of Gamopetalæ, the formation of the endosperm is deferred to subsequent development, by division, of one or several of the special mother cells. These last being homologous with the mother cells of spores, it is legitimate to consider the endosperm of these plants as a sterile female prothallus.

BOTANICAL CONTRIBUTIONS, by Asa Gray. Issued September 1, 1880.—These annual contributions to North American Botany are always greeted with the greatest interest by systematic botanists, and the pages can hardly be cut and run through hastily enough to satisfy their eager curiosity. What new species and genera have come into the world and what have departed this life, are questions that first occur. This paper is largely devoted to recording some of the results of Dr. Gray's elaboration of the vast order Compositæ for his Synoptical Flora. As this portion of the Flora cannot be published at once, botanists are under very great obligations for some of the "advance sheets," containing the results of work upon some of the most perplexing groups. We will note some of the most important things in passing, merely giving what would catch a botanist's eye in turning over the pages In VERNONIA the principal change from Torrey and Gray's Flora is the restoration of *V. altissima*, Nutt., standing between *V. fasciculata* and *V. Baldwinii* or *Noveboracensis*. A new species appears under the name of *V. Lettermanni*, Eng., from Arkansas.

Aplopappus integrifolius, T. C. Porter, is taken up from an unpublished name of a plant collected by the writer in Wyoming in 1872, and three new species are added.

SOLIDAGO is divided into three primary sections or subgenera, viz.: *Virgaurea*, *Euthamia*, and *Chrysoma*. The *Chrysastrum* section of Torrey and Gray is reduced to a subsection of the first, and is made to include *S. petiolaris*.

The southwestern genus APHANOSTEPHUS has now five recognized species which Dr. Gray arranges and characterizes.

A new genus of the Asteroideous Compositæ is proposed under the name of GREENELLA, in honor of Rev. E. L. Greene, and the single species is *G. Arizonica*.

CHÆTOPAPPA, DC., is made to include *Distasis*, DC. The Rocky mountain genus TOWNSENDIA which has so long perplexed us appears fresh from Dr. Gray's hands in the form of a most satisfactory synopsis, and 3 or 4 new species are added. The genus now contains 17 species.

Then follows a synopsis of the genus ERIGERON, which "shades off into *Aster* in more than one direction; and its subgenus *Cœnotus* fairly runs into *Conyza*. It can be limited only by taking into account a combination of characters, and insisting here upon one, there upon another. The general differences between it and *Aster* are found,—1. in the simpler involucre, of equal neither foliaceous nor appendiculate narrow bracts; 2. in the very numerous and narrow rays of the typical species; 3. in the very short, broad, and obtuse style-appendages; 4. simpler stems, naked above or with few more pedunculate heads; 5. less copious and more fragile pappus; 6. smaller achenia; their nervation is of less importance, but mostly there are only the marginal nerves." The three primary sections are *Euerigeron ; Trimorphæa*, and *Cœnotus*, the first containing 51 species, the second 3, the third 5.

"ASTER. The revision of this vast genus is not yet completed, owing to the great difficulty which is experienced in settling the synonomy and the limits of some of the earlier as well as of the later known species. It is intended to accept the genus in the wide extent assigned to it in the Genera Plantarum of Bentham and Hooker, at least so far as North America is concerned, and also to include *Brachyactis*. The subgenera may be arranged in two series; the first of perennials, the second of annuals and biennials; and an endeavor has been made to dispose of the perennial Asters under the following subgenera: AMELLASTRUM; MEGALASTRUM, which connects the genus with *Townsendia*; HELEASTRUM; HESPERASTRUM, containing but a single species, *A. Shastensis*; BIOTIA; EUASTER, or Aster proper; DŒLLINGERIA; IANTHE; ORTHOMERIS. The annual and biennial Asters are grouped in the following subgenera, OXYTRIPOLIUM, CONYZOPSIS, and MACHÆRANTHERA. Among the true Asters are several forms which become species, as *A. Porteri* for *A. ericoides*, var. *strictus* and *A. Pringlei*, from the northern end of Lake Champlain.

A new genus of *Asteroideæ* is proposed under the name of GUNDLACHIA, a West India plant which had been wrongly referred to *Solidago*. Other new Compositæ named belong to the genera *Chænactis*, *Actinolepis*, *Laphamia*, *Fleischmannia*, *Eupatorium*, and *Philactis*.

The second part of the paper contains descriptions of some new species of ASCLEPIAS. Three species from southern-western United States are named by Mr. E. L. Greene, and three from Mexico by Dr. Gray.

The third part describes a new genus of *Gentianaceæ*, and names it GENIOSTEMON, Engelm. & Gray. It contains two species, both of them Mexican.

Part four contains "Miscellaneæ of the North American Flora." Of course there is a new *Astragalus*, and it bears the name of its discoverer, Mr. E. L. Greene. A species of *Sedum* from near Salt Lake City bears the name of our good friend, Mr. Thos. Meehan. It was collected by Mr. John Reading, the live plant being communicated by Mr. Meehan. In dedicating it Dr. Gray pleasantly remarks, "It is so desirable to connect in this way the name of Mr. Meehan with the botany of the country which he has done so much to illustrate, that the actual collector will probably join us in wishing it to be commemorated by this pretty little species of *Sedum*. It will not make much show among Meehan's "Flowers of the United States Illustrated," of which four goodly volumes have already appeared under his editorship; but it is to be hoped that it will find a place in the fifth volume.

A new species of *Douglasia* is described from Mount Hood, Oregon, having been collected by Joseph and T. L. Howell. *Gilia depressa* is decribed by Marcus E. Jones from southern Utah.

A new genus of *Euphorbiaceæ* from Arkansas and Texas is described under the name of REVERCHONIA, in honor of M. Julien Reverchon, of Dallas, Texas. "The relationship of this plant to *Phyllanthus* is so close, that, were it not for a combination of characters, it might be taken for an aberrant *Phyllanthus*."—J. M. C.

GAZETTE FOR JANUARY, 1880.—If any readers of the GAZETTE have duplicate copies of Vol. V, No. 1, we would be glad to buy them at the regular rates.